CPC COOPERATIVE PATENT CLASSIFICATION

H05H PLASMA TECHNIQUE (fusion reactors G21B; ion-beam tubes H01J 27/00; magnetohydrodynamic generators H02K 44/08; producing X-rays involving plasma generation H05G 2/00); PRODUCTION OF ACCELERATED ELECTRICALLY-CHARGED PARTICLES OR OF NEUTRONS (obtaining neutrons from radioactive sources G21, e.g. G21B, G21C, G21G); PRODUCTION OR ACCELERATION OF NEUTRAL MOLECULAR OR ATOMIC BEAMS (atomic clocks G04F 5/14; devices using stimulated emission H01S; frequency regulation by comparison with a reference frequency determined by energy levels of molecules, atoms, or subatomic particles H03L 7/26)

H05H 1/00 Generating plasma; Handling plasma

H05H 1/0006 . {Investigating plasma, e.g. degree of ionisation (electron temperature)}
H05H 1/0012 . . {by using radiation}
H05H 1/0018 . . . {Details}
H05H 1/0025 . . . {by using photoelectric means (H05H 1/0031 to H05H 1/0043 take precedence)}
H05H 1/0031 . . . {by interferrometry}
H05H 1/0037 . . . {by spectrometry (see G01N 3/00)}
H05H 1/0043 . . . {by using infra-red or ultra-violet radiation}
H05H 1/005 . . . {by using X-rays or alpha rays (see G01N 23/00)}
H05H 1/0056 . . . {by using neutrons (see G01N 23/00)}
H05H 1/0062 . . . {by using microwaves (see **G01N 23/34**)}
H05H 1/0068 . . {by thermal means (see G01N 25/00)}
H05H 1/0075 . . . {Langmuir probes}
H05H 1/0081 . . {by electric means (see G01N 27/00, G01R)}
H05H 1/0087 . . {by magnetic means (see G01N 27/00, G01R)}
H05H 1/0093 . . {by acoustic, e.g. ultrasonic means (see G01N 29/02)}

H05H 1/02 . Arrangements for confining plasma by electric or magnetic fields; Arrangements for heating plasma ({G21B 1/00 takes precedence;} electron optics H01J)
H05H 1/03 . . using electrostatic fields
H05H 1/04 . . using magnetic fields substantially generated by the discharge in the plasma
H05H 1/06 . . . longitudinal pinch devices
H05H 1/08 . . . Theta pinch devices {e.g. SCYLLA}
H05H 1/10 . . using externally-applied magnetic field only {e.g. Q-machines, Yin-Yang, base-ball}
H05H 1/105 . . . {using magnetic pumping}
H05H 1/11 . . . using cusp configuration (H05H 1/14 takes precedence)
H05H 1/12 . . . wherein the containment vessel forms a closed or nearly closed loop {(G21B 1/05 takes precedence)}
H05H 1/14 . . . wherein the containment vessel is straight and has magnetic mirrors {electron

mirrors **G21K 1/08B**}

H05H 1/16 . . using externally-applied electric and magnetic field

H05H 1/18 . . . wherein the field oscillate at very high frequency, e.g. in the microwave range {e.g. using cyclotron resonance}

H05H 1/20 . . Ohmic heating

H05H 1/22 . . for injection heating {(G21B 1/15 takes precedence)}

H05H 1/24 . Generating plasma {(gas-filled discharge reactors H01J 37/32; nuclear fusion reactors G21B 1/00; ohmic heating H05H 1/20; injection heating H05H 1/22)}

H05H 1/2406 . . { Dielectric barrier discharges}

H05H 1/2475 . . { Acoustic pressure discharge}

H05H 1/26 . . Plasma torches {(metal working with constricted arc B23K 10/00, **H05H 10/02**; metal spraying B05B 7/18, B05B 7/20)}

H05H 1/28 . . . Cooling arrangements

H05H 1/30 . . . using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/28 takes precedence)

H05H 1/32 . . . using an arc (H05H 1/28 takes precedence)

H05H 1/34 . . . . Details, e.g. electrodes, nozzles {cf. B23K 9/24}

H05H 1/3405 . . . . . {Arc stabilising or constricting arrangements, e.g. by an additional gas flow (by externally applied magnetic fieldH05H 1/40; by using powders or liquidsH05H 1/42; using coaxial protecting fluidH05H 1/341)}

H05H 1/341 . . . . . {using coaxial protecting fluid (arc stabilising or constricting arrangementsH05H 1/3405; introducing materials into the plasmaH05H 1/42)}

H05H 1/36 . . . . . Circuit arrangements (H05H 1/38 ,H05H 1/40 take precedence)

H05H 1/38 . . . . . Guiding or centering of electrodes

H05H 1/40 . . . . . using applied magnetic fields, e.g. for fucusing or rotating the arc {cf. B23K 9/08, **B23K 9/06C5**}

H05H 1/42 . . . . with provision for introducing materials into the plasma, e.g. powder, liquid (electrostatic spraying, spraying apparatus with means for charging the spray electrically B05B 5/00){cf. B23K 9/324, B05B 7/22; arc stabilising or constricting arrangements H05H 1/3405; coaxial protecting fluids H05H 1/341}

H05H 1/44 . . . . using more than one torch

H05H 1/46 . . using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/26 takes precedence)

H05H 1/48 . . using an arc (H05H 1/26 takes precedence)

H05H 1/50 . . . and using applied magnetic fields, e.g. for focusing or rotating the arc

H05H 1/52 . . using exploding wires or spark gaps (H05H 1/26 takes precedence; spark gaps in general H01T)

H05H 1/54 . Plasma accelerators

H05H 3/00 **Production or acceleration of neutral particle beams, e.g. molecular or atomic beams**

H05H 3/02 . Molecular or atomic beam generation {(charge exchange devices G21K 1/14; polarising devices G21K 1/16; using resonance or molecular beams for analysing or

investigating materials G01N 24/002; atomic clock G04F 5/14; beam masers H01S 1/06)}

H05H 3/04 . Acceleration by electromagnetic wave pressure

H05H 3/06 . Generating neutron beams (targets for producing nuclear reactions H05H 6/00; neutron sources G21G 4/02)

H05H 5/00 **Direct voltage accelerators; Accelerators using single pulses** (H05H 3/06 takes precedence)

H05H 5/02 . Details (targets for producing nuclear reactions H05H 6/00)

H05H 5/03 . . Accelerating tubes (vessels or containers of electric discharge tubes with improved potential distribution over surface of vessel H01J 5/06; shields of X-ray tubes associated with vessels or containers H01J 35/16)

H05H 5/04 . { energised by electrostatic generators}

H05H 5/042 . . { of the van de Graaf type}

H05H 5/045 . . { High voltage cascades, e.g. Greinacher cascade}

H05H 5/047 . . { Pulsed generators}

H05H 5/06 . { Multistage accelerators}

H05H 5/063 . . { Tandems}

H05H 5/066 . . { Onion-like structures}

H05H 5/08 . Particle accelerators using step-up transformers, e.g. resonance transformers

H05H 6/00 **Targets for producing nuclear reactions** (supports for targets or objects to be irradiated G21K 5/08){preparation of tritium C01B 4/00}**;** {targets, e.g. pellets for fusion reactions by laser or charged particles beam injection H05H 1/22}

H05H 6/005 . {Polarised targets (polarising devices, e.g. for obtaining a polarised ion beam G21K 1/16)}

H05H 7/00 **Details of devices of the types covered by groups H05H 9/00, H05H 11/00, H05H 13/00**

H05H 7/001 . { Arrangements for beam delivery or irradiation (irradiation systems per se G21K 5/00)}

H05H 7/02 . Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators H03B)

H05H 7/04 . Magnet systems {e.g. undulators, wigglers (free-electron laser H01S 3/0903)}; Energisation thereof

H05H 7/06 . Two-beam arrangements; Multi-beam arrangements {storage rings}; Electron rings

H05H 7/08 . Arrangements for injecting particles into orbits

H05H 7/10 . Arrangements for ejecting particles from orbits

H05H 7/12 . Arrangements for varying final energy of beam

H05H 7/14 . Vacuum chambers (H05H 5/03 takes precedence)

H05H 7/16 . . of the waveguide type

H05H 7/18 . . Cavities; Resonators {(travelling-wave tubes H01J 23/18; hyperfrequency cavities in general H01P 7/04, H01P 7/06)}

H05H 7/20 . . . with superconductive walls

H05H 7/22 . Details of linear accelerators, e.g. drift tubes (H05H 7/02 to H05H 7/20 take precedence)

H05H 9/00 Linear accelerators

H05H 9/005 . { Dielectric wall accelerators}

H05H 9/02 . Travelling-wave linear accelerators {travelling-wave tubes H01J 25/34}

H05H 9/04 . Standing-wave linear accelerators

H05H 9/041 . . { Hadron LINACS}

H05H 9/042 . . . { Drift tube LINACS}

H05H 9/044 . . . { Coupling cavity LINACS, e.g. side coupled}

H05H 9/045 . . . { Radio frequency quadrupoles}

H05H 9/047 . . . { Hybrid systems}

H05H 9/048 . . { Lepton LINACS}

H05H 11/00 Magnetic induction accelerators, e.g. betatrons

H05H 11/02 . Air-cored betatrons

H05H 11/04 . Biased betatrons

H05H 13/00 Magnetic resonance accelerators; Cyclotrons {(strophotrons, turbine tubes H01J 25/62)}

H05H 13/005 . { Cyclotrons}

H05H 13/02 . Synchrocyclotrons, i.e. frequency modulated cyclotrons

H05H 13/04 . Synchrotrons

H05H 13/06 . Air-cored magnetic resonance accelerators

H05H 13/08 . Alternating-gradient magnetic resonance accelerators

H05H 13/085 . . { Fixed-field alternating gradient accelerators [FFAG}]

H05H 13/10 . Accelerators comprising one or more linear accelerating sections and bending magnets or the like to return the charged particles in a trajectory parallel to the first accelerating section, e.g. microtrons

H05H 15/00 Methods or devices for acceleration of charged particles not otherwise provided for

H05H 2001/00 Generating plasma; Handling plasma

H05H 2001/24 . Generating plasma {(gas-filled discharge reactors H01J 37/32; nuclear fusion reactors G21B 1/00; ohmic heating H05H 1/20; injection heating H05H 1/22)}

H05H 2001/2406 .. { Dielectric barrier discharges}

H05H 2001/2412 ... the dielectric being interposed between the electrodes

H05H 2001/2418 ... the electrodes being embedded in the dielectric

H05H 2001/2425 ... the electrodes being flush with the dielectric

H05H 2001/2431 ... Cylindrical electrodes

H05H 2001/2437 ... Multilayer systems

H05H 2001/2443 ... Flow through, i.e. the plasma fluid flowing in a dielectric tube

H05H 2001/245 .... Internal electrodes

H05H 2001/2456 .... External electrodes

H05H 2001/2462 .... Ring electrodes

H05H 2001/2468 .... Spiral electrodes

H05H 2001/2475 .. { Acoustic pressure discharge}

H05H 2001/2481 ... Piezoelectric actuators

H05H 2001/2487 ... Mechanical actuators

H05H 2001/2493 ... Horns

H05H 2001/26 .. Plasma torches {(metal working with constricted arc B23K 10/00, **H05H 10/02**; metal spraying B05B 7/18, B05B 7/20)}

H05H 2001/32 ... using an arc (H05H 1/28 takes precedence)

H05H 2001/34 .... Details, e.g. electrodes, nozzles {cf. B23K 9/24}

H05H 2001/3415 ..... indexing scheme associated with 1/34

H05H 2001/3421 ..... transferred arc mode

H05H 2001/3426 ..... pilot arc

H05H 2001/3431 ..... coaxial cylindrical electrodes

H05H 2001/3436 ..... hollow cathode with internal coolant flow

H05H 2001/3442 ..... cathode with inserted tip

H05H 2001/3447 ..... rod-like cathode

H05H 2001/3452 ..... supplementary electrodes between cathode and anode, e.g. cascade

H05H 2001/3457 ..... nozzle protection devices

H05H 2001/3463 ..... oblique nozzle

H05H 2001/3468 ..... vortex generator

H05H 2001/3473 . . . . . safety means
H05H 2001/3478 . . . . . geometrical details
H05H 2001/3484 . . . . . convergent/divergent nozzle
H05H 2001/3489 . . . . . contact starting
H05H 2001/3494 . . . . . discharge parameter control
H05H 2001/46 . . using applied electromagnetic fields, e.g. high frequency or microwave energy (H05H 1/26 takes precedence)
H05H 2001/4607 . . . Microwave discharges
H05H 2001/4615 . . . . Surface waves
H05H 2001/4622 . . . . Waveguides
H05H 2001/463 . . . . Antennas or applicators
H05H 2001/4637 . . . . Cables
H05H 2001/4645 . . . Radiofrequency discharges
H05H 2001/4652 . . . . Inductively coupled
H05H 2001/466 . . . . . Electrodes
H05H 2001/4667 . . . . . Coiled antennas
H05H 2001/4675 . . . . Capacitively coupled
H05H 2001/4682 . . . . Associated power generators, e. G. Circuits, matching networks
H05H 2001/469 . . . Flow through, i.e the plasma fluid flowing in a non-dielectric vessel
H05H 2001/4692 . . . . dielectric barrier discharge (H05H 1/2406 takes precedence)
H05H 2001/4695 . . . . Arc discharge
H05H 2001/4697 . . . . Glow discharge
H05H 2001/48 . . using an arc (H05H 1/26 takes precedence)
H05H 2001/481 . . . Corona discharges
H05H 2001/483 . . . . Pointed electrodes
H05H 2001/485 . . . . Cylindrical electrodes, e.g. Rotary drums electrodes
H05H 2001/486 . . . . Filamentary electrodes
H05H 2001/488 . . . . Segmented electrodes

H05H 2006/00 **Targets for producing nuclear reactions** (supports for targets or objects to be irradiated G21K 5/08){preparation of tritium C01B 4/00}**;** {targets, e.g. pellets for fusion reactions by laser or charged particles beam injection H05H 1/22}

H05H 2006/002 . Windows

H05H 2006/007 . Radiation protection arrangements , e.g. screens

H05H 2007/00 **Details of devices of the types covered by groups H05H 9/00, H05H 11/00, H05H 13/00**

H05H 2007/001 . { Arrangements for beam delivery or irradiation (irradiation systems per se G21K 5/00)}
H05H 2007/002 . . for modifying beam trajectory , e.g. gantries
H05H 2007/004 . . for modifying beam energy, e.g. spread out Bragg peak devices

H05H 2007/005 . . for modifying beam emittance , e.g. stochastic cooling devices, stripper foils
H05H 2007/007 . . for focusing the beam to irradiation target
H05H 2007/008 . . for measuring beam parameters

H05H 2007/02 . Circuits or systems for supplying or feeding radio-frequency energy (radio-frequency generators H03B)
H05H 2007/022 . . Pulsed systems
H05H 2007/025 . . Radiofrequency systems
H05H 2007/027 . . Microwave systems

H05H 2007/04 . Magnet systems {e.g. undulators, wigglers (free-electron laser H01S 3/0903)}; Energisation thereof
H05H 2007/041 . . for beam bunching , e.g. undulators
H05H 2007/043 . . for beam focusing
H05H 2007/045 . . for beam bending
H05H 2007/046 . . for beam deflection
H05H 2007/048 . . for modifying beam trajectory , e.g. gantry systems

H05H 2007/06 . Two-beam arrangements; Multi-beam arrangements {storage rings}; Electron rings
H05H 2007/065 . . Multi-beam merging , e.g. funneling

H05H 2007/08 . Arrangements for injecting particles into orbits
H05H 2007/081 . . Sources
H05H 2007/082 . . . Ion sources, e.g. ECR, duoplasmatron, PIG, laser sources
H05H 2007/084 . . . Electron sources
H05H 2007/085 . . by electrostatic means
H05H 2007/087 . . by magnetic means
H05H 2007/088 . . by mechanical means, e.g. stripping foils

H05H 2007/12 . Arrangements for varying final energy of beam
H05H 2007/122 . . by electromagnetic means , e.g. RF cavities
H05H 2007/125 . . by mechanical means , e.g. stripping foils
H05H 2007/127 . . by emittance variation , e.g. stochastic cooling

H05H 2007/22 . Details of linear accelerators, e.g. drift tubes (H05H 7/02 to H05H 7/20 take precedence)
H05H 2007/222 . . drift tubes
H05H 2007/225 . . coupled cavities arrangements
H05H 2007/227 . . power coupling , e.g. coupling loops

H05H 2240/00 Test

H05H 2240/10 . at atmospheric pressure

H05H 2240/20 . Non-thermal plasma

H05H 2242/00 Auxiliary systems

H05H 2242/10 . Cooling arrangements
H05H 2242/1005 . . Power supply other than for plasma torches

H05H 2245/00 test

H05H 2245/104 . spiral electrodes

H05H 2245/12 . Applications
H05H 2245/121 . . treatment of exhaust gas, e.g. Ambient air, ozonizers
H05H 2245/1215 . . . Exhaust gas
H05H 2245/122 . . medical applications { e.g. plasma scalpels, blades, bistouri}
H05H 2245/1225 . . . Sterilization of objects
H05H 2245/123 . . surface treatments
H05H 2245/1235 . . . coating of large volume items
H05H 2245/124 . . production of nanostructures
H05H 2245/125 . . portable devices

H05H 2277/00 Applications

H05H 2277/10 . Medical devices
H05H 2277/11 . . Radiotherapy
H05H 2277/113 . . . Diagnostic systems
H05H 2277/116 . . . Isotope production

H05H 2277/12 . Ion implantation

H05H 2277/13 . High energy applications , e.g. fusion

H05H 2277/14 . Portable devices
H05H 2277/1405 . . Detection systems